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## रोगन के लिए अल्युमिनियम पेस्ट — विशिष्टि

( दूसरा पुनरीक्षण )

## Aluminium Paste for Paints — Specification

( Second Revision )

ICS 87.060.20

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## FOREWORD

This Indian Standard (Second Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Raw Materials for Paints, Varnishes and Related Products Sectional Committee had been approved by the Chemical Division Council

This standard was first issued in 1952 and was based largely on the interim coordinated draft, compiled with the assistance of representatives of manufacturers and of various departments and authorities of the Government of India, by the coordinating subcommittee of the no.5 standing committee on specifications for paints and allied stores of the General Headquarters, India (now Army Headquarters). In first revision, important changes in the method of test for determination of leafing value were incorporated. Besides, a number of other minor changes indicated through the experience of those making use of the standard were introduced. Opportunity, while revising, were also taken to substitute metric values for fps ones wherever existing in the original standard.

Raw material for paint products may contain lead and other heavy and toxic metals either because of use as catalyst or use of heavy metal other than lead based compounds in manufacturing as additives for improving performance/stability of product. Taking cognizance of the fact that lead and toxic heavy metal exposure to human being, particularly to children in residential premises is injurious to health and having adverse impact on human health and safety, the Committee responsible for formulation of this standard has felt the need to introduce restriction of lead and toxic heavy metal in all paint raw material product standards. Revision of this standard has been taken up with a view to incorporate the maximum permissible limit of lead and heavy metal restriction clause in this standard. Therefore, in this revision, lead restriction up to a maximum permissible limit of 90 ppm and toxic heavy metals restriction as 0.1 percent maximum has been prescribed to avoid hazardous impact of lead and toxic heavy metal exposure and consequent adverse impact on environment and human health. Further, majority of consumers are not aware of the consequences of lead and other heavy metal toxicity and its long-term implications to human health. Therefore, in this revision, along with lead and toxic heavy metal restriction, a suitable cautionary notice has been included in the marking clause.

The composition of the technical committee responsible for formulation of this standard is given in Annex F.

For the purpose of deciding whether a particular requirement of this standard is complied with the final value, observed or calculated, expressing the result of a test or analysis shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

# Indian Standard

## ALUMINIUM PASTE FOR PAINTS — SPECIFICATION

( Second Revision )

### 1 SCOPE

This standard prescribes requirements, methods of sampling and test for aluminium paste for paints. The material is generally used for making ready mixed paints.

### 2 REFERENCES

The standards listed in Annex A contains provisions which through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated in Annex A.

### 3 TERMINOLOGY

For the purpose of this standard, the definitions given in IS 1303 and following shall apply.

**3.1 Ambient Temperature** — It is a temperature between 21 °C and 38 °C.

**3.2 Standard Atmospheric Conditions for Testing** — An atmosphere with a relative humidity of  $65 \pm 5$  percent and a temperature of  $27 \pm 2$  °C provided that in a given series of experiments, the temperature does not vary by more than  $\pm 1$  °C.

### 4 REQUIREMENTS

#### 4.1 Form and Condition

The material shall be supplied in the form of a smooth homogeneous paste and there shall be no separation of the solvent from the paste.

**4.2** The material shall be based on aluminium powder being in the form of flakes, which can, be ascertained by microscopic examination and a suitable solvent. The paste shall have an aluminium powder content of not less than 64 percent when determined by the method given in IS 101 (Part 8/Sec 2).

**4.3 Leafing Value** — The leafing value of the material shall be not less than 65 percent when determined by the method given in Annex B.

#### 4.4 Lead Restriction

The material shall be tested for restriction from lead in accordance with IS 101 (Part 8/Sec 5), or by Atomic Absorption spectrometer or by ICP. When thus tested the material shall not contain lead or compounds of lead or mixtures of both, calculated as metallic lead exceeding 90 ppm (*see Note*).

NOTE — When no lead is used during production, the product is considered lead free.

#### 4.5 Toxic Heavy Metal Restriction

Product shall not be manufactured using mercury and mercury compounds, cadmium, chromium VI, arsenic, antimony and their oxides. The material shall not contain more than 0.1 percent by weight in total of above toxic heavy metals in the form of natural impurities or impurities entailed by the production process which are contained in the raw material when tested by the relevant Atomic Absorption Spectroscopic methods.

**4.6** The material shall also conform to the requirements given in Table 1.

**Table 1 Requirements for Aluminium Paste for Paints**

( Clause 4.6 )

| Sl No.<br>(1) | Characteristic<br>(2)                         | Requirement<br>(3)                                        | Method of Test<br>(4) |
|---------------|-----------------------------------------------|-----------------------------------------------------------|-----------------------|
| i)            | Residue on sieve, percent by mass, <i>Max</i> | 0.5                                                       | 9 of IS 33            |
|               | a) 150-micron IS sieve 15 (using 30 g sample) | Nil                                                       |                       |
|               | b) 75-micron IS sieve 8 (using 20 g sample)   | 0.5                                                       |                       |
|               | c) 53-micron IS sieve 5 (using 10 g sample)   | 3.0                                                       |                       |
| ii)           | Grease content, percent by mass, <i>Max</i>   | 3.0                                                       | Annex C               |
| iii)          | Settling properties                           | Shall not settle to an apparent volume of less than 12 ml | Annex D               |
| iv)           | Volatile matter, percent by mass, <i>Max</i>  | 36.0                                                      | Annex E               |
| v)            | Keeping properties                            | Not less than one year from date of manufacture           | IS 101 (Part 6/Sec 2) |

**4.7 Total Impurities**

The material shall not contain impurities including copper and lead by more than the following limits on the basis of grease-free material:

|                                                           | Percent |
|-----------------------------------------------------------|---------|
| a) Total impurities including copper and lead, <i>Max</i> | 0.1     |
| b) Copper, <i>Max</i>                                     | 0.01    |
| c) Lead, <i>Max</i>                                       | 0.009   |

**4.7.1** The copper content and impurities other than lead may be determined by relevant methods specified in IS 504 'Methods of chemical analysis of aluminium and its alloys'. The lead content shall be determined by the method described under **4.4** of this standard.

**4.8 Optional Requirement**

The water content of the material when determined by the Karl Fischer Method (IS 2362 Determination of Water by the Karl Fischer Method) shall not be more than 0.15 percent.

**5 TESTS**

**5.1** Tests shall be conducted as prescribed in **4.3** to **4.7**.

**5.2 Quality of Reagents**

Pure chemicals and distilled water (*see* IS 1070) shall be used.

NOTE — 'Pure chemicals' shall mean chemical that does not contain impurity, which affect the results of the analysis.

**6 PACKING AND MARKING****6.1 Packing**

Unless otherwise agreed to between the purchaser and the supplier, the paste shall be packed in metal

containers conforming to IS 1407 Specification for Round Paint Tins and IS 2552 'Steel drums (galvanized and ungalvanized).

**6.2 Marking**

**6.2.1** The containers shall be marked with following details:

- Name of the material;
- Manufacturer's name and trade-mark, if any;
- Mass of the material;
- Lead content (maximum);
- Toxic heavy metals content
- Batch number or Lot number in code or otherwise;
- Month and year of manufacture; and
- A cautionary note as below:
  - Keep out of reach of children; or
  - This product may be harmful if swallowed or inhaled.

**6.2.2 Certification Marking**

The product(s) conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the *Bureau of Indian Standard Act, 2016* and the Rules and Regulations framed thereunder, and the products may be marked with the Standard Mark.

**7 SAMPLING**

The supplier shall submit a tender sample packed in three different containers, each containing not less than 500 g of the material. Representative samples of the material shall be drawn as prescribed under **5** of IS 33.

## ANNEX A

( Clause 2 )

## LIST OF REFERRED INDIAN STANDARDS

| <i>IS No.</i>             | <i>Title</i>                                                                                                                                          | <i>IS No.</i>             | <i>Title</i>                                                                                                                                                   |
|---------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 33 : 1992                 | Inorganic pigments and extenders for paints — Methods of sampling and test                                                                            | 101 (Part 8/Sec 2) : 1990 | Methods of sampling and test for paints, varnishes and related products: Part 8 Test for pigments and other solids, Section 2 Pigments and non-volatile matter |
| 101 (Part 6/Sec 2) : 1989 | Methods of sampling and test for paints, varnishes and related products: Part 6 Durability tests on paint films, Section 2 Keeping properties         | 504 : 1963                | Methods of chemical analysis of aluminium and its alloys                                                                                                       |
| 101 (Part 8/Sec 5) : 1993 | Methods of sampling and test for paints, varnishes and related products : Part 8 Tests for pigments and other solids, Section 5 Lead restriction test | 1070 : 1992               | Reagent grade water                                                                                                                                            |
|                           |                                                                                                                                                       | 1303 : 1983               | Glossary of terms relating to paints                                                                                                                           |
|                           |                                                                                                                                                       | 1407 : 1980               | Round paint tins                                                                                                                                               |
|                           |                                                                                                                                                       | 2362 : 1993               | Determination of water by Karl Fischer method — Test method                                                                                                    |
|                           |                                                                                                                                                       | 2552 : 1989               | Steel drums (galvanized and ungalvanized)                                                                                                                      |

## ANNEX B

( Clause 4.3 )

## DETERMINATION OF LEAFING VALUE

## B-1 DEFINITION

**B-1.1 Leafed Area** — The completely covered surface free from cracks or breaks, when tested as prescribed under **B-5**.

## B-2 APPARATUS

**B-2.1 Spatula** of polished steel which shall be free from taper, with the length of blade not less than 140 mm, width of 13 to 14 mm and the thickness not more than 1.6 mm.

**B-2.2 Test-Tube** — 150 mm in length, with an internal diameter of 19 mm.

**B-2.3 Glass Cylinder** — 200 mm in length, with an internal diameter of 40 mm.

**B-2.4 Cork** with top diameter 41 mm and bottom diameter 38 mm.

## B-3 REAGENTS

**B-3.1 Coumarone-Indene** — Commercially pure resin, with melting point 127° to 137 °C; specific gravity 1.07 to 1.09, and acid value not more than 0.5 or Petrez SP-90 resin.

**B-3.2 Petroleum Hydrocarbon Solvent** — 145/205 low aromatic (conforming to IS 1745 'Specification for petroleum hydrocarbon solvents').

## B-4 PREPARATION OF LEAF-TESTING VEHICLE

## B-4.1 Procedure

Grind the resin finely. Prepare a solution by dissolving 30 g of the resin in 100 ml of petroleum hydrocarbon solvent with gentle heating. Adjust the specific gravity to between 0.867 to 0.874 at 27 °C. Allow it to stand for 36 h, decant and retain the clear portion in a stoppered glass bottle for use.

**B-5 PROCEDURE**

**B-5.1** The test shall be carried out at a temperature between 21° and 38 °0.

**B-5.2** Transfer 25 ml of the vehicle to a clean container. Accurately weigh 3.5 g of the aluminium paste in a small dish. Add about 4 ml out of the 25 ml quantity of the vehicle and mix to a stiff paste with a spatula or a small stiff brush. Add approximately 5 ml more of the vehicle and stir to a smooth mixture, then add the remainder of the vehicle and continue stirring to obtain complete dispersion. Immediately transfer enough of the mixture to the test-tube to give a depth of about 110 mm with the spatula immersed. Remove any bubble on the surface of the liquid by dipping and withdrawing the end of the spatula. Dip the spatula to the bottom of the mixture and rotate it gently through an arc of about 90° for 10 s, reversing the direction of rotation once a second. Avoid the formation of bubbles and excessive splashing. Withdraw the spatula at a uniform rate in a total time of  $6 \pm 1$  s, without touching the sides of the test-tube, and suspend it vertically in the closed glass cylinder containing 5 ml of the leafing liquid. If the spatula is withdrawn at this rate, not more than three drops of the mixture will drain from it. At the end of

6 min, after which time the leafing comes to rest, measure the length of the leafed area on both sides of the spatula. Clean the spatula by rinsing it in orthoxylene and wipe dry with a clean cloth. Stir the mixture in the test-tube and repeat the determination.

**B-5.3** The cylinder, when not containing a suspended spatula, shall be closed by means of a cover glass or stopper so that the atmosphere within it remains saturated with the vapour from the leafing liquid when the spatula is inserted. A convenient method of suspending the spatula in the closed glass cylinder is to pass the steel handle of the spatula through the centre of the cork used to close the cylinder.

**B-6 CALCULATION**

Calculate the leafing value from the average of at least five determinations according to the following formula:

$$\text{Leafing value} = \frac{100 A}{L}$$

where

A = the average length of the completely leafed area; and

L = the total immersed length of the spatula.

**ANNEX C**

( Table 1, Sl No. ii )

**DETERMINATION OF GREASE CONTENT****C-1 PROCEDURE**

**C-1.1** Take sufficient quantity of the material to contain approximately 10 g of aluminium powder, weigh it accurately and extract in a Soxhlet extractor with acetone (*see* IS 170) for about three hours, during which period the solvent shall siphon at least eight times per hour. Remove the volatile solvents from the extract in the extraction flask in the usual manner, and weigh.

**C-1.2** Remove the acetone from the sample in the thimble. Return the thimble to the Soxhlet extractor and

extract with alcohol for about three hours, during which period the solvent shall siphon at least eight times per hour. Remove the volatile solvents from the extract, and weigh.

**C-2 CALCULATION**

The sum of the two extracts gives the grease content of the sample taken for the test. Express it as percentage of the weight of the material taken for the test.

**ANNEX D**

( Table 1, Sr. No. iii )

**DETERMINATION OF SETTLING PROPERTIES****D-L PROCEDURE**

Accurately weigh sufficient quantity of the material to contain about 10 g of aluminium powder and add to about 35 ml of ortho xylene contained in a 50 ml stoppered measuring cylinder, the 50 ml graduation mark of which is approximately 13 cm from the zero

mark. Shake the mixture thoroughly, make the level of the liquid up to 50 ml with ortho xylene and again shake. Allow the contents of the cylinder to stand undisturbed for 18 h at a temperature between 21° and 38 °C. At the end of this period, note the upper line of separation of the aluminium powder, which indicates the apparent volume of settlement.

**ANNEX E**

( Table 1, Sl No. iv )

**DETERMINATION OF VOLATILE MATIER****E-1 DEFINITION**

**E-1.1 Volatile Matter** —The percentage loss in weight on heating the material to constant weight in an oven at  $100^{\circ}\pm 2^{\circ}$  °C, when determined as described below (see E-2.1).

**E-2 PROCEDURE**

**E-2.1** Weigh accurately about 2 g of the material ill a tared flat-bottom dish about 8 cm in diameter and keep

in an oven maintained at  $100^{\circ}\pm 2^{\circ}$  °C for two hours. At the end of this period, transfer the dish to a desiccator containing a suitable desiccating agent, and cool. Remove the dish and weigh. Repeat the heating at half-hour intervals till constant weight is obtained.

**E-2.2** Express the loss in weight as percentage of the weight of the material taken for the test.

## ANNEX F

( Foreword )

## COMMITTEE COMPOSITION

Raw materials for Paints, Varnishes and Related Products Sectional Committee, CHD 21

| <i>Organization</i>                                         | <i>Representative(s)</i>                                                                 |
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### Amendments Issued Since Publication

| Amend No. | Date of Issue | Text Affected |
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